

1 (December 2, 2002)

2 **General Requirements for All Membrane Waterproofing Systems**

3 The primer and membrane waterproofing shall extend from the roadway  
4 deck up onto the curb face the thickness of the asphalt overlay. Special  
5 care shall be used at the curb face to see that the membrane adheres to the  
6 concrete.

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8 The Contractor shall not begin application of membrane waterproofing deck  
9 seal to the bridge until demonstrating, to the satisfaction of the Engineer,  
10 that all labor, equipment, and materials necessary to apply the membrane  
11 and asphalt concrete overlay are either on hand or readily available to  
12 complete the work in a timely manner.

13  
14 **Evaluating Membrane Waterproofing Effectiveness**

15 The waterproofing membrane will be visually inspected by the Engineer  
16 for uniformity of application, tears, punctures, and bonding. All such  
17 deficiencies shall be repaired as approved by the Engineer prior to  
18 placement of the membrane protection.

19  
20 **Membrane Waterproofing System A**

21 The primer shall be applied to the cleaned concrete surfaces at the rate and  
22 according to the procedure recommended by the membrane manufacturer.  
23 All surfaces to be covered by the membrane shall be thoroughly and  
24 uniformly coated with primer. Precautionary measures shall be taken to  
25 ensure that pools and thick layers of primer are not left on the deck surface  
26 to scum over. Drying time prior to applying the membrane shall normally be  
27 as recommended by the manufacturer, however, the membrane shall not be  
28 applied until substantially all volatile material has dissipated from the primer.

29  
30 The prefabricated membrane shall be applied to the primed curb and bridge  
31 deck surfaces by either hand methods or mechanical applicators. The  
32 membrane shall be placed in such manner that a shingling effect will be  
33 achieved and that any water which accumulates will drain toward the curb  
34 and the drain pipes. Each strip shall be overlapped a minimum of 100  
35 millimeters or as recommended by the manufacturer. An adhesive or a  
36 wide tipped torch to cause tackiness shall be used, if necessary, to assure a  
37 good seal of the joints. Hand rollers or other satisfactory pressure  
38 apparatus shall be used on the applied membrane to assure firm and  
39 uniform contact with the primed concrete surfaces.

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41 Any torn or cut areas, or narrow overlaps, shall be patched using a  
42 satisfactory adhesive and by placing sections of the membrane over the  
43 defective area in such a manner that the patch extends at least 150  
44 millimeters beyond the defect. The patch shall be rolled or firmly pressed  
45 onto the surface.

46  
47 The fabric shall be neatly cut and contoured at all joints as directed by the  
48 Engineer.

49  
50 After the membrane waterproofing has been completed, the membrane  
51 shall be cut with two right angle cuts at all deck drain pipes. The cuts shall  
52 be made to the inside diameter of the drain pipes, after which the corners of

1	the membrane waterproofing shall be turned down into the drains and laid in
2	a coating of asphalt binder.
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4	<b>Membrane Waterproofing System B</b>
5	The primer, if required, shall be applied to the pavement as specified by
6	membrane manufacturer.
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8	If the primer has become contaminated, the pavement shall be cleaned and
9	a new primer applied and allowed to cure before the membrane is applied.
10	
11	The membrane material shall be heated in accordance with the
12	manufacturer's recommendations. To ensure against overheating, a
13	double-boiler type heater shall be used and the membrane material shall be
14	circulated or agitated during the heating process.
15	
16	The membrane shall be applied to the clean, dry (primed) surface at a
17	nominal rate of 2.3 liters per square meter and in accordance with the
18	manufacturer's recommendations as to application temperatures.
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20	Placement of the asphalt concrete wearing surface shall be done in
21	accordance with the recommendations of the coating manufacturer.
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23	<b>Membrane Waterproofing System C</b>
24	<b>Preparation of Asphalt/Rubber</b>
25	<b>Both Methods</b>
26	The method and equipment for combining the rubber and asphalt
27	shall be so designed and accessible that the Engineer can readily
28	determine the percentages, by weight, of each of the two materials
29	being incorporated into the mixture.
30	
31	<b>Method 1</b>
32	The rubber and modified asphalt shall be combined in a ratio of 20
33	± 2 percent rubber to 80 ± 2 percent asphalt by weight and reacted
34	for a sufficient time at 205C ±15C to produce a product with the
35	following properties:
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37	Viscosity at 205C 1700 cps max.
38	Softening Point (R & B) 49C min.
39	Flex Temperature (90° Bend Test) -7C max.
40	
41	In the event a delay occurs when the product is ready to be
42	applied, the heat shall be turned off until the job resumes.
43	
44	<b>Method 2</b>
45	The percent of combined rubber shall be as indicated by the
46	mixture design for specific project requirements by weight of total
47	mixture, that is, by total weight of asphalt cement plus asphalt
48	modified (if used) plus granulated rubber.
49	
50	The temperature of the asphalt shall be between 177 and 218C at
51	the addition of the vulcanized rubber. The asphalt and rubber shall
52	be combined and mixed together in a blender unit then reacted in

the distributor for a period of time as required by the Engineer and, based on laboratory testing, by the asphalt/rubber supplier. The temperature of the asphalt/rubber mixture shall be above 163C during the reaction period.

After the reaction between asphalt and rubber has occurred, the viscosity of the hot asphalt/rubber mixture may be adjusted for spraying or better wetting of the cover material by the addition of a diluent. The diluent shall comply with the requirements for kerosene type diluent (Method 2) and shall not exceed 7.5 percent by volume of the hot asphalt/rubber mixture.

When a job delay occurs after full reaction, the asphalt/rubber may be allowed to cool. The asphalt/rubber shall be reheated slowly just prior to application but not to a temperature exceeding 163C. An additional quantity of diluent not exceeding three percent by volume of the hot asphalt/rubber mixture may be added after reheating.

## **Construction of Membrane**

### **Equipment**

The equipment used for mixing and spreading the asphalt and rubber shall be a self-powered pressure distributor equipped with a separate power unit, a distributing pump capable of pumping the specified material at the specified rate through the distributor tips, and equipment for heating the bituminous material. The distribution bar on the distributor shall be fully circulating with nipples and valves so constructed that they are bathed in the circulating asphalt to the extent that the nipples will not become partially plugged with congealing asphalt. Distributor equipment shall include a tachometer, pressure gauges, volume measuring devices, and a thermometer for reading temperatures of tank contents. The spray bars on the distributor shall be controlled by a bootman riding at the rear of the distributor in such a position that operation of all sprays is in full view and accessible to him for controlling spread widths.

### **Application**

The application rate of the hot asphalt/rubber mixture shall be 2.5 liters  $\pm$ 0.45 liters per square meter uniformly applied.

All transverse joints shall be made by placing building paper over the ends of the previous applications, and the joining application shall start on the building paper used. Once the application process has progressed beyond the paper used, the paper shall be removed and disposed of to the satisfaction of the Engineer. If the Contractor can demonstrate the ability to produce satisfactory transverse joints without paper, no paper will be required as long as the joints remain satisfactory. Any unsatisfactory joint shall be repaired at the Contractor's expense.